

BIOENGINEERING & BIOMEDICAL ENGINEERING RESEARCH SEMINAR



MULTIMODE BIOMEDICAL OPTICAL IMAGING FOR THE CLINIC

- *THAT'S HOW THE LIGHT GETS IN* -

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ABSTRACT

For the bench-to-bedside dream of translational research to become a reality, we need to develop biophotonic approaches that, while technologically sophisticated, allow deployment into clinical settings [1]. Our focus area is where light (an exceptional investigative tool) and patient meet [2], and improvements that yield better outcomes. We approach this by identifying and addressing obstacles preventing the timely clinical adoption of laboratory-based advances, not the least of which is the difficulty of detecting and characterizing very small entities (molecules, cells) within the human body, especially dynamically, and preferably without contrast agents. How and where we look becomes critically important, especially if one targets (as one should) early diagnosis; for this, novel tools and strategies are needed, with likely new results. We proposed and implemented a multimode approach to biomedical optical imaging at all organizational levels [3], featuring hyperspectral imaging, and optimized for earlier, more quantitative and reproducible detection of abnormalities and a tighter spatio-temporal coupling between such diagnosis and intervention. Addressing major areas of unmet need in the clinical realm with these new capabilities could yield important improvements in disease management. Our work on cancer [4], stem cell [5], vascular [6] and neuro (highlighting very early detection of Alzheimer's Disease) [7] applications will be described, with emphasis on the disruption needed to achieve the desired imaging performance, and their physics and engineering underpinnings. Thoughts [8] about better ways for academia, the clinical and the corporate world to work together for innovative biophotonic solutions and their use in addressing major disease will be briefly outlined.

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